

**WHAT IS CLAIMED IS:**

1. An apparatus for detecting endpoint of a plasma-based semiconductor fabrication process, the apparatus comprising:
  - a processing chamber configured to receive an excited species from a plasma source, the processing chamber including a throttle valve configured to output an exhaust from the processing chamber;
  - a bypass foreline positioned downstream from the throttle valve, the bypass foreline including an isolation valve; and
  - an endpoint detection cell, the endpoint detection cell positioned downstream from the isolation valve and selectively isolated from exposure to chamber exhaust by the isolation valve.
2. The apparatus of claim 1 wherein the endpoint detection cell further comprises a cathode, an anode, and an optical detector, the optical detector detecting an optical signal resulting from an electrical discharge between the cathode and the anode.
3. The apparatus of claim 1 wherein the endpoint detection cell further comprises a cathode, an anode, and an RF power detector, the RF power detector detecting an RF power of a plasma generated in the endpoint detection cell.
4. The apparatus of claim 1 wherein the processing chamber is one of a plasma-enhanced chemical vapor deposition (PECVD) chamber and a high density plasma chemical vapor deposition (HDP-CVD) chamber.
5. The apparatus of claim 1 wherein the isolation valve is controlled by a controller, the controller programmed to open the isolation valve after an initial phase of the plasma based process.
6. A method of detecting an endpoint of a plasma based semiconductor fabrication process, the method comprising:
  - providing an endpoint detector;
  - isolating the endpoint detector from exposure to an exhaust of a plasma based semiconductor fabrication process during an initial stage of the process; and
  - exposing the endpoint detector to exhaust from the process during a later stage of the process.

7. The method of claim 6 wherein the plasma based semiconductor fabrication process is a chamber cleaning process.

8. The method of claim 6 wherein the plasma based semiconductor fabrication process is one of a plasma enhanced chemical vapor deposition (PECVD) process and a high density plasma chemical vapor deposition (HDP-CVD) process.

9. The method of claim 6 wherein the plasma based semiconductor fabrication process is a plasma etching process.

10. The method of claim 6 wherein isolation of the endpoint detector reduces unwanted deposition of material on exposed surfaces of the endpoint detector, thereby improving a stability of an optical signal produced from an electrical discharge between a cathode and an anode of the endpoint detector.

11. The method of claim 6 wherein isolation of the endpoint detector reduces unwanted deposition of material on exposed surfaces of the endpoint detector, thereby improving a stability of an RF power signal of a plasma generated in the endpoint detector.

12. The method of claim 6 wherein the endpoint detector is exposed after a predetermined elapsed time of the process corresponding to an endpoint qualifier.

13. A method of operating a substrate processing chamber having an endpoint detection cell in fluid communication with an exhaust line of the processing chamber, the method comprising:

transferring a substrate into the substrate processing chamber;  
processing the substrate in the chamber such that deposits form on an interior chamber surface;  
transferring the substrate from the chamber;  
etching the deposits through exposure to an excited species;  
exhausting etched byproducts from the chamber through the exhaust;  
and

identifying an endpoint of the etching using the endpoint detection cell, such that endpoint detection cell is isolated from the exhaust line during a first portion of the etching, and during a second portion of the etching the endpoint detection cell is exposed to the etch byproducts.

14. The method of claim 13 wherein isolation of the endpoint detection cell reduces unwanted deposition of material on exposed surfaces of the endpoint detection cell, thereby improving a stability of an optical signal produced from an electrical discharge between a cathode and an anode of the endpoint detector.

15. The method of claim 13 wherein isolation of the endpoint detection cell reduces unwanted deposition of material on exposed surfaces of the endpoint detection cell, thereby improving a stability of an RF power signal of a plasma generated in the endpoint detection cell.

16. The method of claim 13 wherein the second portion occurs after a predetermined elapsed time of the etching corresponding to an endpoint qualifier.